

DEPARTMENT OF THE ARMY
DIRECTORATE OF PUBLIC WORKS
HEADQUARTERS, FORT BRAGG GARRISON COMMAND (AIRBORNE)
INSTALLATION MANAGEMENT AGENCY
FORT BRAGG, NORTH CAROLINA

FINAL

DECISION DOCUMENT

FOR RESOURCE CONSERVATION AND RECOVERY ACT
REMEDIAL ACTION

SOLID WASTE MANAGEMENT UNIT 86 AND 88, (AEDBCC #CCFTBR0011)
FORT BRAGG, NORTH CAROLINA

7 MARCH 2006

Prepared for:

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1.0 Basis And Purpose of RCRA RA.

a. This decision document describes the selected Remedial Action (RA) to be performed at Solid Waste Management Units (SWMUs) 86 and 88 as part of the Fort Bragg Installation Restoration Program (IRP). This action will satisfy Resource Conservation Recovery Act (RCRA) Facility Investigation (RFI), US Environmental Protection Agency (EPA) and the State of North Carolina Department of Environment and Natural Resources (NCDENR) requirements.

b. Based on the results of sampling events performed during previous investigations (United States Center for Health, Promotion, and Preventative Medicine (USCHPPM RFI Report 2000; US Army Corps of Engineers [2001-2005]), which performed extensive sampling of surface and sub-surface soils, groundwater, surface water and stream-bed sediments and pursuant to 15A NCAC 2L .0106 (1), Fort Bragg has selected long-term management of groundwater wells, historically exhibiting groundwater contaminant levels of Volatile Organic Compounds (VOC) in excess of North Carolina Groundwater Protection Standards, monitored natural attenuation, and institutional controls (groundwater use restrictions), documented in the Base Master Plan (BMP) as it's selected remedies for the site. The SWMU 86 is the former 659th Battery Neutralization Tank located near building F-3040 and SWMU 88 is the former 659th Used Oil Pit located near building F-2534. Under North Carolina Rules, 15A NCAC 13A, sites cannot be given a designation of No Further Action (NFA) if there are exceedances of any groundwater action levels. In any criteria applied to determining the Selected Remedy of the site, groundwater monitoring is mandated based on North Carolina 2L requirements, 15A NCAC 2L.0100 & .0200. Long-term monitoring will occur every 2 years for a total of 5 sampling events or 10 years. This cycle was chosen to best fit funding and contracting obstacles. Once four consecutive sampling events establish no exceedances of the North Carolina Groundwater Protection Standards for the above listed constituents, a NFA determination would be requested. Long-term monitoring will continue until no analyses exceed NC 2L standards. Concurrence by NCDENR is required for any selected remedy of these sites and for termination of selected remedy. Long term monitoring will ensure that levels found during the investigation phase are not increasing.

1.1 Introduction. Operable Unit 6 consists of SWMUs 16, 86, & 88. This Decision Document will focus on SWMUs 86 and 88. Solid Waste Management Unit 16 information is included for background purposes only, since a NFA was approved by NCDENR for SWMU 16 in 2004 (See Figure 1 for site map of 86 and 88).

a. In August of 2002, a Supplemental RCRA Facility Investigation (SRFI)/Corrective Measures Study (CMS), at SWMUs 86 and 88, was performed. Groundwater sampling, and surface and subsurface soil sampling was performed to determine environmental conditions at the SWMUs. The SRFI/CMS Report was prepared in consideration of RCRA

Permit No. NC 8210020121 issued to Fort Bragg, RFI Guidance, and guidance for RCRA Corrective Action.

b. **SWMU 86 - 659th Vehicle Maintenance Battery Neutralization Tank.** The 659th Vehicle Maintenance Facility is located approximately 2000 feet to the west of the SWMU 16 and is near building F-3040. The battery neutralization tank consisted of an 8-foot long concrete tank with a diameter of 7 feet, which was originally lined with 1/4 inch plastic and covered with a metal grate. In 1986, the EPA inspected the neutralization tank and discovered that the integrity of the liner had degraded due to contact with battery acid. During the RCRA Facility Assessment (RFA) in April 1988, white stains were observed on the ground surface surrounding the tank. The neutralization tank was refurbished in 1993. The use of the tank was discontinued after March 1999 when battery replacement activities were placed under a contract with Exide, Inc. From 1993 to 2000, several investigations were completed at SWMU 86, as documented in the RCRA Facility Investigation by the USACHPPM dated September 2000. No iron or lead was detected above the instrumentation detection limits from any well at the site.

c. **SWMU 88 - 659th Vehicle Maintenance Used Oil Pit.** The SWMU 88 is an active site located near building F-2534, approximately 200 feet northwest of the SWMU 86. Solid Waste Management Unit 88 has been previously described as a site consisting of a used oil pit for collecting oily runoff from the 659th Vehicle Maintenance yard's asphalt curbed wash pad. The pit was described as being approximately three feet in diameter and was formerly partially covered by a piece of metal, which was later replaced by a concrete cover. It is located at the southeast corner of the wash rack. It has been determined that the used oil pit has also acted as a storm drainage catch basin. Waste managed in SWMU 88 includes runoff contaminated with used oil and spent antifreeze. From 1993 to 2000, several investigations were completed at SWMU 88, as documented in the RCRA Facility Investigation by the USACHPPM dated September 2000. Low levels of tetrachloroethene (PCE) and methyl tert-butyl ether (MTBE) were detected in all four wells at this site.

1.2 AREA OF INVESTIGATION. Solid Waste Management Units 86 and 88 are located on the Fort Bragg Military Installation, Cumberland County, North Carolina, southeast of the intersection of Gruber Road and Black Jack Street Road, in the southeastern cantonment area. Gruber Road bounds the SWMUs 86 and 88 investigation area to the north. Solid Waste Management Units 86 and 88 are bounded to the east by woods, to the south by an engineered drainage ditch, and to the west by Black Jack Street. Nine monitoring wells were constructed throughout the SWMUs 86 and 88 area to determine groundwater contamination levels.

1.3 NATURE OF CURRENT PROPERTY USE. Solid Waste Management Units 86 and 88 are located in an area occupied by vehicle maintenance facility. The land use at SWMUs 86 and 88 and surrounding area is industrial with no current plans to change the land use. In the

heavily forested areas south of SWMUs 86 and 88 (designated as open space and transition) are wetlands and habitat for the endangered red-cockaded woodpecker. No schools, playgrounds, churches, or hospitals are located within 1,500 feet of the site.

1.4 PROPERTY OWNERSHIP. The site is currently owned and operated by the United States Department of Defense/Department of the Army. The Real Estate contact is Ms. Dewanna Kennedy of Real Property Management (910) 396-4139. Mr. Edward Schwacke is the contact for the Installation Restoration Program (IRP) and can be reached at (910) 432-8470.

2.0 JUSTIFICATION AND PURPOSE OF CORRECTIVE ACTION. The EPA has provided risk based corrective action guidance that specifies the major components to be considered in selecting a corrective action. These include the following threshold criteria: (1) protect human health and the environment and the management of wastes; (2) attain media cleanup standards set by the implementing agency (e.g., NCDENR); (3) control the source of the releases so as to reduce or eliminate, to the extent practicable, further releases that might pose a threat to human health and the environment; (4) comply with any applicable standards for management of wastes; and (5) other factors. Corrective action alternatives meeting the threshold criteria are then balanced against the following: (1) long-term reliability and effectiveness; (2) reduction of toxicity, mobility, or volume of wastes; (3) short-term effectiveness; (4) implementability; and (5) cost.

2.1 LOCATION AND MISSION OF FORT BRAGG. The US Army Military Reservation at Fort Bragg was established in 1918 as the major logistic, training, and mobilization deployment center for the XVIII Airborne Corps and 82d Airborne Division, which is part of the US Army's mobile infantry, assault, and armored forces. It is also home to the Army's largest support command (1st COSCOM) and the Special Operations Command. Fort Bragg occupies about 161,500 acres in southeastern North Carolina. Approximately 92,000 acres are designated for field maneuvers, exercises, firing ranges, impact areas, and parachute drop zones. The cantonment area, in the eastern part of Fort Bragg, occupies 11,000 acres and includes about 4,800 buildings. Most military maintenance and production facilities, supply facilities, operation and training facilities, various community facilities, and family and troop housing are in the cantonment area. Pope Air Force Base borders Fort Bragg north of the cantonment area.

2.2 SITE INFORMATION. SWMUs 86 and 88 consist of two sites within an area of approximately 10 acres.

a. The 659th Vehicle Maintenance Facility is located approximately 2000 feet to the west of the SWMU 16 and is near the building F-3040. Solid Waste Management Unit 86 was a battery neutralization tank consisting of an 8-foot long concrete tank with a diameter of 7 feet, which was originally lined with 1/4 inch plastic

and covered with a metal grate. In 1986, the EPA inspected the neutralization tank and discovered that the integrity of the liner had degraded due to contact with battery acid. During the RCRA Facility Assessment (RFA) in April 1988, white stains were observed on the ground surface surrounding the tank. The neutralization tank was refurbished in 1993. The use of the tank was discontinued after March 1999 when battery replacement activities were placed under a contract with Exide, Inc.

b. Solid Waste Management Unit 88 is an active site located near building F-2534 approximately 200 feet northwest of the SWMU 86. The SWMU 88 has been previously described as a site consisting of a used oil pit for collecting oily runoff from the 659th Vehicle Maintenance yard's asphalt curbed wash pad. The pit was described as being approximately three feet in diameter and was formerly partially covered by a piece of metal, which was later replaced by a concrete cover. It is located at the southeast corner of the wash rack. It has been determined that the used oil pit has also acted as a storm drainage catch basin. Waste managed in SWMU 88 includes runoff contaminated with used oil and spent antifreeze.

3.0 SURFACE WATER AND TOPOGRAPHY.

a. An east-west trending ridge divides Fort Bragg into two drainage sub-basins. The northern sub-basin drains into the Little River; the southern sub-basin drains into tributaries of Cross Creek and Rockfish Creek. Little River, Cross Creek, and Rockfish Creek are tributaries of the Cape Fear River, which is east of Fort Bragg.

b. Surface runoff at SWMUs 86 and 88 drains into an un-named tributary of Little Cross Creek which drains into Bonnie Doone Lake. No contamination associated with SWMUs 86 and 88 has been found in Little Cross Creek. Little Cross Creek leaves the Fort Bragg Installation and enters the Public Works Commission watershed for the city of Fayetteville in a location known as Bonnie Doone Lake.

c. Ground water is not used as a source of drinking water on the Fort Bragg installation. During times of drought, water impoundments are used to supplement the source of Fort Bragg drinking water, the Little River. Several impoundments are present at Fort Bragg and include Young Lake and McFayden Pond in the northern portion of the cantonment area, Lake Arthur in the northwestern corner of the installation, McKellars Pond beyond the western edge of the cantonment area, and Smith Lake and Texas Pond in the southeastern part of the cantonment area. The closest impoundment to SWMUS 86 and 88 is an unnamed pond, located approximately two miles to the southeast, below the confluence of Big Branch and Beaver Creeks. It is not used to supplement the water system.

3.1 SITE GEOLOGY.

a. Geologic units in the Fort Bragg area, from oldest to youngest, consist of the Carolina Slate Belt rocks, which comprise the basement rock, the Cape Fear Formation, and the Middendorf Formation. Carolina Slate Belt rocks, which underlie the younger sedimentary rocks, are of Precambrian and Cambrian age and are composed of metavolcanic, metasedimentary, and igneous rock United States Geological Survey (USGS) 1996. The elevation of the top of basement rock ranges from 180 feet above sea level at Southern Pines (USGS 1996), near the western edge of the military reservation, to 110 feet below sea level near the confluence of the Cape Fear River and Rockfish Creek (USGS 1996). The Cape Fear and Middendorf Formations overlie the basement rock and saprolite. These formations are part of the generally southeastward dipping and thickening wedge of sediments that constitutes the Atlantic Coastal Plain deposits. These formations generally are considered to be representative of an upper delta-plain environment (USGS 1996).

b. The soils within the Fort Bragg cantonment area are the result of weathering of the unconsolidated sandy sediments of the Coastal Plain. The soils range from moderately to excessively well drained. Soils in upland areas are sandy, acidic, low in organic matter, and have low fertility. The upland soils have brittle, loamy or clayey subsoils associated with Blaney, Gilead, and Lakeland soil types. Soils in low-lying areas typically have a heavier texture (containing more organic and clayey material) than upland soils. Soils in low-lying areas are poorly drained, resulting in swampy areas along streams. Johnston loam typically is found in low-lying areas of Fort Bragg (USGS 1996). Because many of these soils have similar properties, transition zones between the soil types are not always apparent.

3.2 HYDREOLOGY AND PUBLIC WATER SUPPLIES.

a. Fort Bragg currently draws an average of 8.5 million gallons of water each day from the surface waters of the Little River. Fort Bragg also has the option to purchase up to three million gallons per day from the City of Fayetteville to meet emergency needs. Fort Bragg operates five public water systems that are permitted for operation by the state of North Carolina. The primary water treatment plant has a 16 million gallon per day capacity. The water treatment plant treats and supplies drinking water to the entire cantonment area, Simmons Army Airfield, the Central Vehicle Wash Facility, and all of Pope Air Force Base.

b. Water supplies for the City of Fayetteville, which is southeast of Fort Bragg, are obtained from the Cape Fear River and impoundments along the Cross Creek and Little Cross Creek, which drain the southeastern part of Fort Bragg. The water supply for the Town of Spring Lake, adjacent and northeast of Fort Bragg, is purchased from the City of Fayetteville and Harnett County.

c. An east-to-west trending ridge divides Fort Bragg into two drainage sub basins. The northern sub basin drains into Little River; the southern sub basin drains into tributaries of Cross Creek and Rockfish Creek. Beaver Creek flows into Cumberland Creek, a tributary of the Cape Fear River, which is east of Fort Bragg. Streams located on the military reservation generally are low gradient and, in many areas, have poorly defined channels, which grade into swampy areas. Streambeds consist of unconsolidated materials, typically silt or clay.

d. The Fort Bragg area is underlain by three freshwater aquifers: the saprolite-basement, Cape Fear, and Middendorf aquifers. The saprolite-basement rock aquifer is below the Cape Fear Formation, and its depth ranges from 140 ft Below Land Surface (BLS) in low-lying parts of the cantonment area to 300 feet or more BLS in the central and western parts of Fort Bragg. The saprolite-basement aquifer is generally assumed to yield little water, and no supply wells in this area are known to solely tap this aquifer. The Cape Fear aquifer is composed of the Cape Fear Formation, which is primarily clay interbedded with silt and silty sand under confined conditions. The uppermost 5 to 10 ft of the Cape Fear Formation in the Fort Bragg area forms the Cape Fear confining unit. This confining unit restricts vertical movement of water between the overlying sediments and the silty-sand units of the Cape Fear aquifer. Several wells on the Fort Bragg reservation are screened in this aquifer. East of Fort Bragg, the Cape Fear aquifer is used for public and industrial water supplies (USGS 1996).

e. The Middendorf aquifer primarily consists of coarse- to fine-grained silty or clayey sands with interbedded light-gray to tan clays. The interbedded and discontinuous clay layers in this aquifer support local perched water zones. Perched water zones in the Fort Bragg area generally are within 20 feet of land surface, and groundwater in these perched zones is under unconfined conditions and referred to as the "surficial aquifer." The saturated thickness of the water table within a perched water zone is typically only a few feet. Many of the perched water zones dry out during the growing season and are not a reliable source of water supply.

f. Groundwater in the lower part of the Middendorf aquifer is commonly under confined or semi confined conditions, as determined by interbedded clay layers, whereas groundwater in the upper part of the Middendorf aquifer is under unconfined conditions. The potentiometric surface of the aquifer is as much as 80 ft BLS in upland areas of the military reservation and near land surface along perennial streams (discharge areas for the Middendorf aquifer).

g. The sandy soils, which cover most of Fort Bragg and the Sandhills hydrologic area, are leached beds of the Middendorf Formation. These sands are highly permeable and allow rapid

infiltration of precipitation, which is the primary source of groundwater recharge.

3.3 POTENTIAL RECEPTORS AND SENSITIVE AREAS.

a. Surface runoff at SWMUs 86 and 88 appears to generally flow south into a tributary of Little Cross Creek which feeds Bonnie Doone Lake, located off the Fort Bragg Military Installation. Groundwater also flows to the south towards Bragg Boulevard. Some of this groundwater may discharge into a tributary of Beaver Creek. There are no family housing areas within 500 to 750 feet of SWMUs 86 and 88.

b. In the heavily forested areas east of SWMUs 86 and 88 (designated as open space and transition) are wetlands and habitat for the endangered red-cockaded woodpecker. No schools, playgrounds, churches, or hospitals were noted within 1,500 feet of the site.

4.0 EVALUATION OF CORRECTIVE ACTION TECHNOLOGIES. A no-action with groundwater monitoring alternative and two categories of corrective action technologies were identified for the soil and groundwater: institutional controls (land-use restrictions and groundwater use restrictions), and groundwater monitoring. The technologies were evaluated using the screening criteria of effectiveness, implementability, and cost. The no-action alternative provides a baseline against which other technologies can be compared. Under the no-action alternative, no further action would be taken to mitigate risks posed by groundwater contamination. Groundwater monitoring would be performed to document contaminant concentrations with monitored natural attenuation. This alternative has the lowest associated cost. The acceptability of the no-action alternative is judged in relation to the assessment of known site risks and by comparison with other corrective action technologies. The no-action alternative is not considered viable because it provides no reliable or effective method for protecting human health from groundwater contamination; therefore, the no-action alternative has been eliminated from further evaluation.

a. Land use restrictions include actions taken to restrict access to contaminated areas to protect human health based on the criteria of long-term reliability and effectiveness; reduction of toxicity, mobility, or volume of wastes; short term effectiveness, implementability; and cost. Land-use restrictions would include controls implemented through the BMP. Groundwater use restrictions would be documented in the BMP. The Decision Document and the survey plat will be added to the BMP as the selected remedy of the SWMUs. Land-use and institutional controls have been retained for future consideration.

b. Groundwater monitoring would include sampling and analysis of site monitoring wells to monitor contaminant concentration trends or to verify that hazardous groundwater constituents are not posing a

threat to human health. Groundwater monitoring is effective, readily implementable, and can be a cost-effective method for monitoring changes in the site conditions and providing an early warning to prevent potential human exposure to contaminated groundwater. North Carolina regulations do not allow NFA sites if groundwater levels exceed any of the NC 2L standards; therefore, groundwater monitoring is required by regulatory statutes and has been retained for further consideration.

5.0 SELECTED CORRECTIVE REMEDIAL ACTION. The 2005 sampling event was the second of two required monitoring events to be used for further characterization of this site. Low levels of VOCs and RCRA metals were detected. Many of the VOCs detected were above NC 2L standards. No RCRA metal was detected above its NC 2L standard in 2005.

a. Detected concentrations of chloroform and PCE were generally trending downward from previous detections. Detected concentrations of MTBE were generally trending upward and were detected in one well that it had never been detected in before. Generally speaking, however, since the levels are so low (most being J flagged), the variations up or down have no statistical significance.

b. During this sampling event, most RCRA metal concentrations showed a downward trend. Only four wells showed any RCRA metal detections other than barium. This additional sampling was triggered by the previous detections of VOCs and some metals in the ground water exceeding the NC 2L standards in the 2002 and 2003 studies. The chlorinated solvents and metals in ground water were the primary focus constituents for this sampling event. Since these detections are very low level, but persistent, the recommendation is for ground-water monitoring to be performed every two years with a five-year review only, until natural attenuation reduces levels to below NC 2L standards. The reason for requesting longer periods between sampling is based on the fact that very little change has occurred at this site over the past three years of monitoring.

6.0 CONCLUSION.

a. Groundwater in the cantonment area is not used as a source of drinking water. As long as Fort Bragg adheres to this practice and does not use groundwater near SWMUS 86 and 88 as a water-supply source, risk posed by groundwater contaminants should be alleviated. As long as SWMUS 86 and 88 remains wooded or industrial, and land use restrictions are in place and documented in the BMP to prevent soil disturbance, risks associated to human health and the environment, with contaminants in groundwater should be alleviated. Once four consecutive sampling events establish no exceedance of the NC Groundwater Protection Standards for these constituents, a NFA determination would be requested.

b. Long-term monitoring will continue until no analyses exceed NC 2L standards. Life cycle cost for the selected remedy is \$160,000.00.

The Decision Document will be made available for public review on the Fort Bragg website <http://www.bragg.army.mil/envbr/restoration.htm>.



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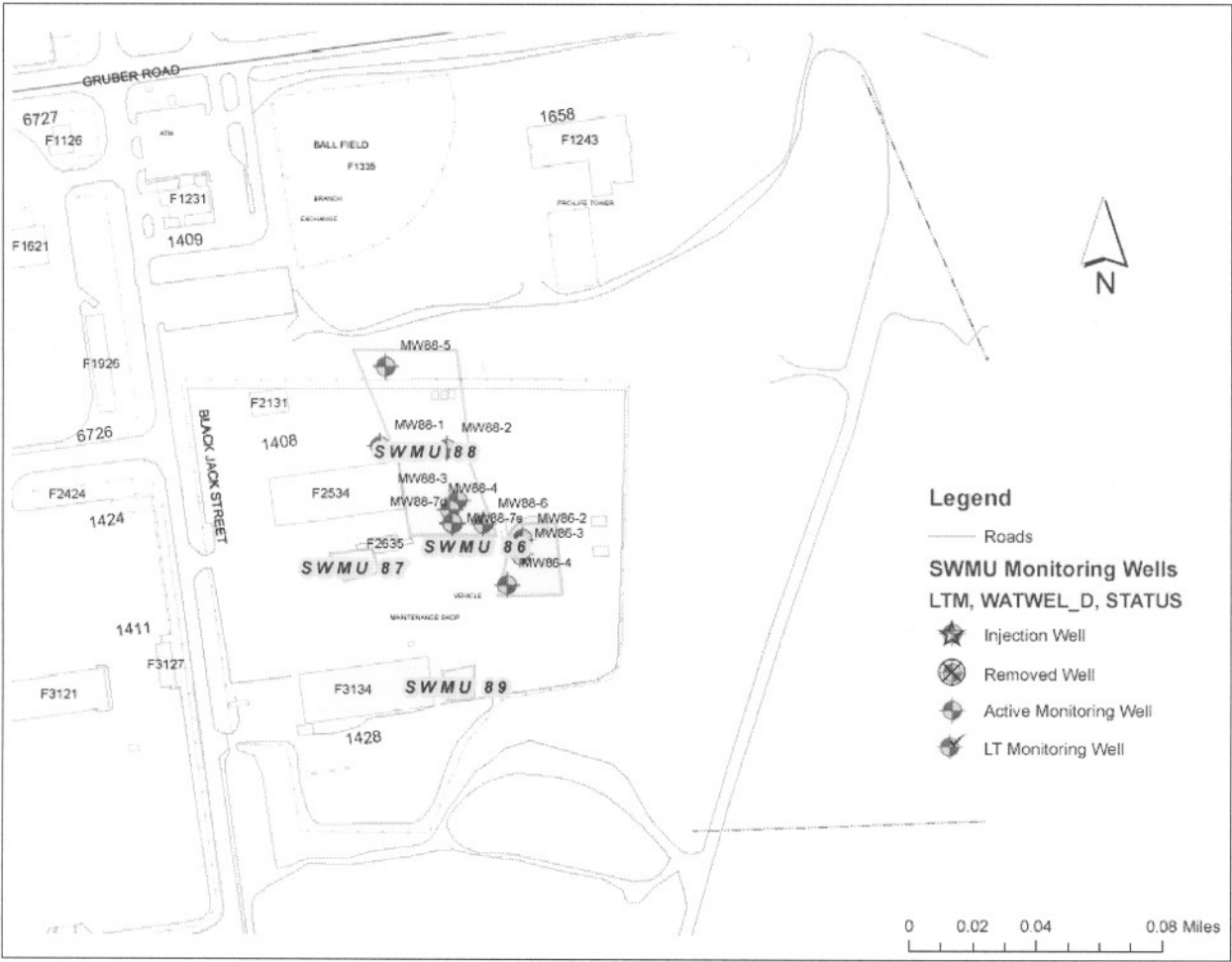


AL AYCOCK
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ACRONYMS

AMSL	above mean sea level
BGS	below ground surface
BLS	below land surface
BMP	Base Master Plan
CMS	Corrective Measures Study
COC	constituent of concern
COPC	constituent of potential concern
CY	calendar year
DD	Decision Document
DOD	U.S. Department of Defense
EPA	U.S. Environmental Protection Agency
HQ	hazard quotient
ILCR	incremental lifetime cancer risk
IMAC	interim maximum acceptable concentration
IRP	Installation Restoration Program
MCL	maximum contaminant level
MTBE	methyl tert-butyl ether
NCAC	North Carolina Administrative Code
NCDENR	North Carolina Department of Environment and Natural Resources
O&M	operations and maintenance
PCB	polychlorinated biphenyl
PRG	preliminary remediation goal
DPW	Directorate of Public Works
RBC	risk-based concentration
RCRA	Resource Conservation and Recovery Act
Redox	oxidation-reduction potential
RFI	RCRA facility investigation
RGO	remedial goal option
SCM	site conceptual model
SVOC	semivolatile organic compound
SWMU	solid waste management unit
TCE	Trichloroethylene
TCLP	Toxicity Characteristic Leaching Procedure
TPH	total petroleum hydrocarbons
USACE	U.S. Army Corps of Engineers
USGS	U.S. Geological Survey
VOC	volatile organic compound

Figure 1, Site Map



SWMUs 86 and 88 Site Map